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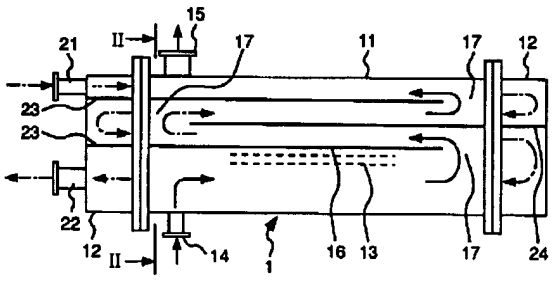
(54)【発明の名称】　非共沸混合冷媒用横形蒸発器

(57)【要約】

【目的】　実用的な長さとし、冷媒の液面の制御が容易で、製造容易で冷媒の入口と出口での冷媒の成分比に変化を生じない非共沸混合冷媒用横形蒸発器を提供する。

【構成】　蒸発器１は、シェル１１側に冷媒を流し、チューブ１３側に被冷却流体を流す満液式シェルアンドチューブ形の非共沸混合冷媒用横形のものであって、シェル１１内の空間を、この空間の両端面を端面とする複数の小空間に分割し、かつ下方の小空間よりも上方の小空間の容積を大きくするとともに、隣接する小空間同志を連通させる開口部１７を上記両端面のいずれか一方の側に形成し、シェル１１の下部の冷媒液入口１４から上部の冷媒ガス出口１５まで連続したジグザク状の冷媒流路を形成する斜行板１６と、シェル１１を軸方向に貫通する複数のチューブ１３内での上記被冷却流体の流動方向を上記冷媒流路における冷媒の流動方向とは逆にする仕切り壁２３，２４を有するヘッダー１８とを設けて形成してある。



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【特許請求の範囲】

【請求項1】　シェル側に冷媒を流し、チューブ側に被冷却流体を流す満液式シェルアンドチューブ形の非共沸混合冷媒用横形蒸発器において、シェル内の空間を、この空間の両端面を端面とする複数の小空間に分割し、かつ下方の小空間よりも上方の小空間の容積を大きくするとともに、隣接する小空間同志を連通させる開口部を上記両端面のいずれか一方の側に形成し、上記シェルの下部の冷媒液入口から上部の冷媒ガス出口まで連続したジグザク状の冷媒流路を形成する斜行板と、上記シェルを軸方向に貫通する複数のチューブ内での上記被冷却流体の流動方向を上記冷媒流路における冷媒の流動方向とは逆にする仕切り壁を有するヘッダーとを設けて形成したことを特徴とする非共沸混合冷媒用横形蒸発器。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、シェル側に冷媒を流し、チューブ側に被冷却流体を流す満液式シェルアンドチューブ形の非共沸混合冷媒用横形蒸発器に関するものである。

【0002】

【従来の技術】従来、被冷却流体の流れ方向に沿った複数の蒸発室と、被冷却流体の最下流側に位置する蒸発室に非共沸混合冷媒の供給口と、被冷却流体の最上流側に位置する蒸発室に冷媒ガスの取出口とを備えるとともに、被冷却流体の流れ方向に隣接する蒸発器間に冷媒液用導通路と冷媒ガス用導通路とを備えた非共沸混合冷媒用蒸発器が公知である（特開昭61－262568号公報）。一定の圧力下で露点，沸点が異なる複数の冷媒（単一冷媒）を混合させた非共沸混合冷媒を用いた冷凍装置では、蒸発器での伝熱性能を向上させるために、通常、冷媒と被冷却流体（水，ブライン等）のそれぞれにおいて生じる出入口温度差を利用した対向流、さらに具体的には1パス対向流の熱交換器が採用されている。なお、本明細書において流体が入口から出口に向かって流動する間に、流動方向を変えない場合、即ち流動方向を一定に保つ場合を1パス、一度だけ変える場合を、即ち流動方向を正，逆と変える場合を2パスという。3パス以上についても同様であり、例えば流動方向を正，逆，正と変える場合を3パス，正，逆，正，逆と変える場合を4パスという。

【0003】図6は、非共沸混合冷媒を用いた場合における1パス対向流の蒸発器の出入口での、冷媒と被冷却流体の望ましい温度変化の様子を示したものである。冷媒と被冷却流体とは、互いに逆方向に流動しつつ熱交換し、冷媒はその入口から出口に向かって温度上昇してゆく一方、被冷却流体はその入口から出口に向かって温度降下してゆく。そして、蒸発器内での各位置で冷媒と被冷却流体との間で一定の温度差を保ち、上記各位置で同じように熱交換が行われる。

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【0004】この場合、冷媒入口（即ち、冷媒液入口）および冷媒出口（冷媒ガス出口）での冷媒の成分比を同一にするのがよく、この点で、蒸発器としては、シェル側が被冷却流体で、チューブ側が冷媒で、チューブ側の出口に至る前に冷媒を完全に蒸発させる直膨式のものが望ましい。一方、伝熱性能を向上させる為には、シェル側が冷媒で、チューブ側が被冷却流体で、シェル内で冷媒を流動させることはしない満液式か望ましい。

【0005】上記公報に記載の従来公知の蒸発器は、上記チューブ式と直膨式を兼ね備えたものであって、冷媒を移動させ、複数の冷却室である蒸発室を通過させる過程で混合冷媒液の成分比を低沸点冷媒が大の状態から高沸点冷媒が大の状態に段階的に変化させるようにしたものである。具体的には、各蒸発室を冷媒液用移送管と冷媒ガス用移送管により接続し、各移送管の位置、そこでの流量を調整することにより冷媒液，ガス分、各々の成分比を段階的に変化させるようにしてある。

【0006】

【発明が解決しようとする課題】上記従来の装置の場合、構造が余りにも複雑となる他、各蒸発室での液面レベルの制御を必要とするという問題がある。また、被冷却流体の流路が1パスの構造になっており、流体速度を最適化、具体的には1．5～2．5m／secにしようとすると、熱交換器である蒸発器の長さは非実用的な長さになる。これに対して、蒸発器の長さを実用的なものにしようとすると、複数の円筒を並列配置するか、単一円筒を複数分割した構造を採用する必要がある。複数円筒を並列配置すれば装置がおおきくなるとともに複雑になり、複数分割した構造を採用すれば個々の液面制御ができないという問題が生じる。本発明は、斯る従来の問題点を課題としてなされたもので、実用的な長さとし、冷媒の液面の制御が容易で、製造容易で冷媒の入口と出口での冷媒の成分比に変化を生じない非共沸混合冷媒用横形蒸発器を提供しようとするものである。

【0007】

【課題を解決するための手段】上記課題を解決するために、本発明は、シェル側に冷媒を流し、チューブ側に被冷却流体を流す満液式シェルアンドチューブ形の非共沸混合冷媒用横形蒸発器において、シェル内の空間を、この空間の両端面を端面とする複数の小空間に分割し、かつ下方の小空間よりも上方の小空間の容積を大きくするとともに、隣接する小空間同志を連通させる開口部を上記両端面のいずれか一方の側に形成し、上記シェルの下部の冷媒液入口から上部の冷媒ガス出口まで連続したジグザク状の冷媒流路を形成する斜行板と、上記シェルを軸方向に貫通する複数のチューブ内での上記被冷却流体の流動方向を上記冷媒流路における冷媒の流動方向とは逆にする仕切り壁を有するヘッダーとを設けて形成した。

【0008】

【作用】上記発明のように構成することにより、冷媒液に流動性が得られ、冷媒液は各小空間をほぼ水平方向に抵抗なく移動して下部に溜まり、冷媒ガスは上方に向かって移動し、冷媒液から蒸発したガスのガス抜きが容易に行われるようになり、かつ最終の小空間のみの液面制御で足りるようになる。

【0009】

【実施例】次に、本発明の一実施例を図面にしたがって説明する。図1，2は、本発明の第1実施例に係る非共沸混合冷媒用横形蒸発器1を示し、円筒形状のシェル11の両側にヘッダー12を取り付け、シェル11内に多数のチューブ13を貫通させて形成してある。なお、図1では、実際には多数のチューブ13が横方向に表れるが、図面を見易くするためにこのチューブ13については、1本のみ例示的に示してある。

【0010】シェル11は、下部に冷媒液入口14を、上部に冷媒ガス出口15を有している。また、シェル11内には、この内部の空間を、その両端面を端面とする複数の小空間に分割する複数枚の斜行板16、本実施例では3枚の斜行板16が配設してある。また、この斜行板16により仕切られる小空間については、下方の小空間よりも上方の小空間の容積が大きくなっている。さらに、隣接する小空間同志を連通させる開口部17を上記両端面のいずれか一方の側に形成してあり、上記シェル11の下部の冷媒液入口14から上部の冷媒ガス出口15まで連続したジグザク状の冷媒流路が形成されている。

【0011】例えば、上記実施例の場合には、小空間は4個形成され、図1において実線の矢印で示すように、冷媒液入口14から第1の小空間に流入した冷媒は右方に移動し、右端の開口部17から第2の小空間に流入して左方に移動し、左端の開口部17から第3の小空間に流入して右方に移動し、右端の開口部17から第4の小空間に流入して左方に移動し、冷媒ガス出口15から出てゆくようになっている。なお、本実施例の場合は、4パス構造になっている。ここで、斜行板16の傾斜角は、限定するものではないが、水平方向に対して30°～45°の間にあるのが望ましい。

【0012】本実施例の場合、シェル11の両側に取り付けた二つのヘッダー12のうち、図1において左側のヘッダー12には、被冷却流体用の入口21および出口22が設けてある。また、この左側のヘッダー12の内部には、上記第1の小空間を貫通するチューブ13と第2，第3の小空間を貫通するチューブ13、および第2，第3の小空間を貫通するチューブ13と第4の小空間を貫通するチューブ13とを隔離する2枚の仕切り壁23が配設してある。さらに、右側のヘッダー12には、第1，第2の小空間を貫通するチューブ13と第3，第4の小空間を貫通するチューブ13とを隔離する仕切り壁24が配設してある。そして、シェル11内では、冷媒の流動方向とチューブ13内の被冷却流体の流動方向が逆となり、対向流の状態になる。また、上記冷媒が全体的には下方から上方に向けて移動するのに対して、この被冷却流体は、図1において一点鎖線の矢印で示すように、全体的には上方から下方に向けて移動するようになっている。さらに、各チューブ13は、冷媒液中に完全に浸るようになっており、満液式のものと同様のものとなっている。

【0013】なお、各チューブ13内での被冷却流体の流速を同一にするために、上記各小空間を貫通するチューブ13の本数を同じにするのが望ましい。そして、上述したように斜行板16の左右の端部に、交互に開口部17を設けてジグザグ状の複数パスにすることにより、流動抵抗が少なく、冷媒液に流動性が得られ、冷媒液が各小空間をほぼ水平方向に抵抗なく移動して下部に溜まり、各小空間での液面レベルがほぼ均一化されるとともに、冷媒ガスが上方に溜まり冷媒液から蒸発したガスのガス抜きが容易となっている。図2は冷媒液、冷媒ガスの移動の様子を示したもので、同図中矢印Aで示すように、第1の小空間から第4の小空間へと移動し、冷媒ガスは上方に向かって移動し易くなっており、同じく矢印Bで示すように移動する。ちなみに、第1の小空間から第4の小空間に向かって高沸点冷媒の比率は増大する。

【0014】また、このように満液式で、複数パス対向流とすることにより、伝熱性能が良好で、被冷却流体の流速を最適化し、蒸発器の長さを実用的なものとすることができるようになっている。さらに、冷媒液の液面制御は最終の小空間、上記実施例の場合では、第4の小空間のみでよく、液面制御が簡単で、この最終空間は大きな空間をとることができるようになっており、冷媒ガス出口15から冷媒を液体状態で流出させる、いわゆる液バックが生じないようになっている。

【0015】図3は、上記第1実施例に係る蒸発器1を適用したヒートポンプを示し、圧縮機31，凝縮器32，膨張弁33，蒸発器1を含む冷媒の閉じた循環流路が形成されている。蒸発器1には、この内部の、例えば第4の小空間における冷媒液の液面レベルを制御するレベルコントローラ34を設け、この液面レベルの高低に応じて膨張弁33の開度を調節するようになっている。即ち、この液面レベルが高くなる程、膨張弁33の開度は大きくなる。また、凝縮器32には高温側熱源となる水を循環させる流路35、蒸発器1の入口21および出口22には、低温側熱源となる被冷却流体である水、或はブラインを循環させる流路36が接続してある。

【0016】そして、周知のように圧縮機31にて圧縮された冷媒ガスは凝縮器32に送られ、ここで冷媒ガスは流路35内を流れる水に熱を与えて温度降下して凝縮して膨張弁33に至る。凝縮して液体状態になった冷媒は、膨張弁33にて膨張することにより一部蒸発して蒸発器1内に流れ、ここで上述したようにチューブ13を

介して熱交換して、被冷却流体から熱を奪って、完全に蒸発し、冷媒ガスとなって圧縮機３１に戻り、以後上記同様の循環を繰り返す。一方、蒸発器１にて冷却された被冷却流体は冷熱源として利用される。

【００１７】図４は、本発明の第２実施例に係る非共沸混合冷媒用横形蒸発器２を示し、図１，２に示す蒸発器１とは、新たに高沸点冷媒液抽出口４１を設けた点を除き、他は実質的に同一であり、互いに共通する箇所については同一番号を付して説明を省略する。さらに、詳説すれば、この高沸点冷媒液抽出口４１は、本実施例において、最終の小空間である第４の小空間に開口させたものである。そして、この蒸発器２は、高沸点冷媒液が滞留し易い最終の小空間から、この冷媒液を強制的に抽出して、別途熱交換器を設け、ここで完全に蒸発させることを可能としものである。

【００１８】図５は、蒸発器２を適用したヒートポンプを示し、図３に示すヒートポンプと互いに共通する箇所については、同一番号を付して説明を省略する。このヒートポンプでは、凝縮器３２と膨張弁３３との間に吸込液ガス熱交換器５１を設ける一方、蒸発器２の冷媒ガス出口１５を出た冷媒ガスを吸込液ガス熱交換器５１に導く流路５２と、この流路に連通し、吸込液ガス熱交換器５１から圧縮機３１の吸込口に至る流路５３とを設けてある。また、流路５２には高沸点冷媒液抽出口４１に接続した流路５４を合流させてある。

【００１９】そして、蒸発器２からの冷媒ガス，と高沸点とを混合させて、吸込液ガス熱交換器５１に導き、ここで凝縮器３２からの高圧の冷媒液との間で熱交換させ、冷媒液抽出口４１からの高沸点の冷媒液を完全に蒸発させて、圧縮機３１に送り出すようになっている。なお、吸込液ガス熱交換器５１には、この内部の、高沸点冷媒液抽出口４１からの冷媒液の液面レベルを制御するレベルコントローラ５５を設け、この液面レベルの高低に応じて膨張弁３３の開度を調節するようになっている。即ち、この液面レベルが高くなる程、膨張弁３３の開度は大きくなる。このように、高沸点冷媒液を吸込液ガス熱交換器５１に導くことにより、冷媒液を流動させ、伝熱性能をより一層向上させ、高沸点冷媒液を完全にガス化させるようしてある。そして、斯る構成により、冷媒の成分比を蒸発器２の入口と同一に保ち、かつ蒸発器２の冷媒液入口１４での温度を低下させ、蒸発器２で熱交換する熱量を増大させることにより、成績係数を向上させるようになっている。

【００２０】

【発明の効果】以上の説明より明らかなように、本発明によれば、シェル側に冷媒を流し、チューブ側に被冷却流体を流す満液式シェルアンドチューブ形の非共沸混合冷媒用横形蒸発器において、シェル内の空間を、この空間の両端面を端面とする複数の小空間に分割し、かつ下方の小空間よりも上方の小空間の容積を大きくするとともに、隣接する小空間同志を連通させる開口部を上記両端面のいずれか一方の側に形成し、上記シェルの下部の冷媒液入口から上部の冷媒ガス出口まで連続したジグザク状の冷媒流路を形成する斜行板と、上記シェルを軸方向に貫通する複数のチューブ内での上記被冷却流体の流動方向を上記冷媒流路における冷媒の流動方向とは逆にする仕切り壁を有するヘッダーとを設けて形成してある。

【００２１】このように、斜行板のいずれかの一方の側に、交互に開口部を設けてジグザグ状の複数パスにすることにより、流動抵抗が少なく、冷媒液に流動性が得られ、冷媒液が各小空間をほぼ水平方向に抵抗なく移動して下部に溜まり、各小空間での液面レベルがほぼ均一化されるとともに、冷媒ガスが上方に溜まり冷媒液から蒸発したガスのガス抜きが容易となる。また、このように満液式で、複数パス対向流とすることにより、伝熱性能が良好で、被冷却流体の流速を最適化し、蒸発器の長さを実用的なものとすることができるよう他、冷媒液の液面制御は最終の小空間のみでよく、液面制御が簡単で、この最終空間は大きな空間をとることができるようになっており、冷媒ガス出口から冷媒を液体状態で流出させる、いわゆる液バックを奉仕することができる等の効果を奏する。

【図面の簡単な説明】

【図１】　本発明の第１実施例に係る非共沸混合冷媒用横形蒸発器の断面図である。

【図２】　図１に示す蒸発器のII－II線断面図である。

【図３】　図１，２に示す蒸発器を適用したヒートポンプの機器構成を示す図である。

【図４】　本発明の第２実施例に係る非共沸混合冷媒用横形蒸発器の断面図である。

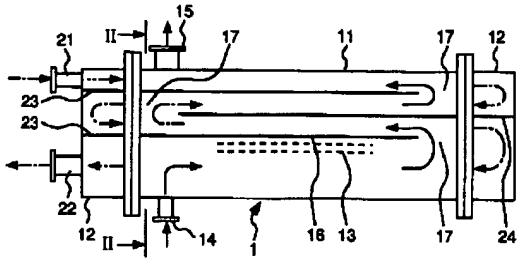
【図５】　図４に示す蒸発器を適用したヒートポンプの機器構成を示す図である。

【図６】　非共沸混合冷媒を用いた場合における対向流の蒸発器における望ましい温度変化の様子を示す図である。

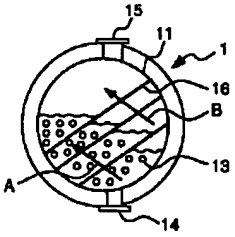
【符号の説明】

１，２　蒸発器	１１　シェル
１２　ヘッダー	１３　チューブ
１４　冷媒液入口	１５　冷媒ガス出口
１６　斜行板	１７　開口部

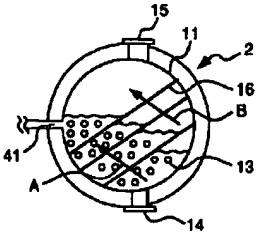
【図1】



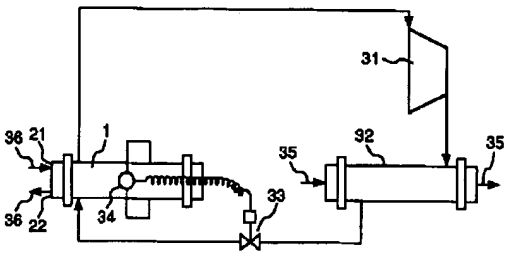
【図2】



【図4】



【図3】



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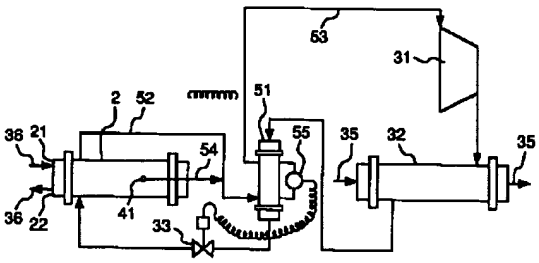
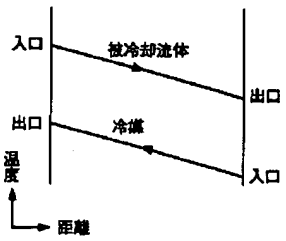


【図6】



PAT-NO: JP408254373A

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TITLE: HORIZONTAL TYPE EVAPORATOR FOR NONAZEOTROPIC MIXTURE REFRIGERANT

PUBN-DATE: October 1, 1996

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NAME COUNTRY
KOBE STEEL LTD N/A

APPL-NO: JP07058867

APPL-DATE: March 17, 1995

INT-CL (IPC): F25B039/02, F28D007/16

ABSTRACT:

PURPOSE: To facilitate the surface control of a mixture refrigerant, to facilitate the production of an evaporator, and to prevent the change of the mixture refrigerant constituent ratio of a refrigerant inlet to a refrigerant outlet, by providing headers with partition walls whereby the flowing direction of a fluid to be refrigerated in a plurality of tubes passing through a shell is reversed against the flowing direction of the mixture refrigerant.

CONSTITUTION: A space in a shell 11 is divided into a plurality of small spaces, both end faces of each of the small spaces are the end faces of the shell 11, and the volume of the small space at the upper side is formed larger than that of the small space at the lower side. Opening parts 17 through which the small spaces neighboring with each other communicate are formed on either side of the end faces. Obliquely placed plates forming a refrigerant flow way in zigzag shape, continuing from an liquid refrigerant inlet 14 at the lower part of the shell 11 to a gaseous refrigerant outlet 15 at the upper part thereof are provided. Furthermore, headers 12 having partition walls 23, 24 are formed so that the flowing direction of a fluid to be refrigerated in a plurality of tubes 13 axially passing through the shell 11 can be reversed against the flowing direction of a refrigerant in the refrigerant flow-way.

PATENT ABSTRACTS OF JAPAN

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SAKURABA ICHIRO
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(54) HORIZONTAL TYPE EVAPORATOR FOR NONAZEOTROPIC MIXTURE REFRIGERANT

(57)Abstract:

PURPOSE: To facilitate the surface control of a mixture refrigerant, to facilitate the production of an evaporator, and to prevent the change of the mixture refrigerant constituent ratio of a refrigerant inlet to a refrigerant outlet, by providing headers with partition walls whereby the flowing direction of a fluid to be refrigerated in a plurality of tubes passing through a shell is reversed against the flowing direction of the mixture refrigerant.

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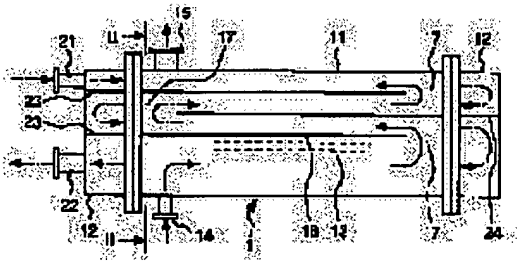

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[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] In the broadside evaporator for non-azeotropy mixing refrigerants of the filled liquid system shell and the tube form where pour a refrigerant to a shellside and a cooled fluid is poured to a sink and a tubeside While dividing the space in shell into two or more small space which makes the both-ends side of this space an end face and making the volume of upper small space larger than downward small space The skew plate which forms opening which makes the adjoining small space comrade open for free passage in the either side of the above-mentioned both-ends sides, and forms the refrigerant passage of the shape of JIGUZAKU which continued from the refrigerant liquid inlet port of the lower part of the above-mentioned shell to the upside refrigerant gas outlet, The broadside evaporator for non-azeotropy mixing refrigerants characterized by preparing and forming the header which has the bridgewall which makes contrary to the flow direction of the refrigerant in the above-mentioned refrigerant passage the flow direction of the above-mentioned cooled fluid within two or more tubes which penetrate the above-mentioned shell to shaft orientations.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the broadside evaporator for non-azeotropy mixing refrigerants of the filled liquid system shell and the tube form where pour a refrigerant to a shellside and it pours a cooled fluid to a sink and a tubeside.
[0002]
[Description of the Prior Art] While equipping with the output port of a refrigerant gas conventionally the evaporation chamber located in two or more evaporation chambers along the flow direction of a cooled fluid, and the evaporation chamber located in the lowest style side of a cooled fluid at the feed hopper of a non-azeotropy mixing refrigerant, and the maximum upstream of a cooled fluid, the evaporator for non-azeotropy mixing refrigerants equipped with the flow way for refrigerant liquid and the flow way for refrigerant gases between the evaporators contiguous to the flow direction of a cooled fluid is well-known (JP,61-262568,A). In the freezer using the non-azeotropy mixing refrigerant with which two or more refrigerants (single refrigerant) with which a dew-point differs from the boiling point under a fixed pressure were mixed, in order to raise the heat transfer engine performance in an evaporator, the heat exchanger of one-pass counterflow is specifically adopted as the counterflow and the pan which usually used the entrance temperature gradient produced in each of a refrigerant and cooled fluids (water, brine, etc.). In addition, when not changing the flow direction while a fluid flows toward an outlet in this specification from an inlet port, the case where the case, i.e., the flow direction, where the case where the flow direction is kept constant is changed only an one pass and at once is changed with forward and reverse is called two pass. The same is said of 3 or more ****s, for example, the case where the case where the flow direction is changed with forward, reverse, and forward is changed with three pass, forward, reverse, forward, and reverse is called four pass.
[0003] Drawing 6 shows the situation of the desirable temperature change of the refrigerant and the cooled fluid in the entrance of the evaporator of one-pass counterflow at the time of using a non-azeotropy mixing refrigerant. While heat exchange of them is carried out and a refrigerant and a cooled fluid carry out the temperature rise of the refrigerant toward an outlet from the inlet port, flowing to hard flow mutually, they carry out the temperature reduction of the cooled fluid toward an outlet from the inlet port. And a temperature gradient fixed between a refrigerant and a cooled fluid is maintained in each location within an evaporator, and heat exchange is performed similarly in each above-mentioned location.
[0004] In this case, it is good to make the same the component ratio of the refrigerant in a refrigerant inlet port (namely, refrigerant liquid inlet port) and a refrigerant outlet (refrigerant gas outlet), it is this point, and the thing of the **** type which a shellside is a cooled fluid, a tubeside is a refrigerant, and evaporates a refrigerant completely as an evaporator before reaching the outlet of a tubeside is desirable. On the other hand, in order to raise the heat transfer engine performance, that a tubeside makes a refrigerant flow within shell by the cooled fluid with a refrigerant has a desirable shellside in the filled liquid system which is not carried out.
[0005] The evaporator with a conventionally well-known publication in the above-mentioned official report combines the above-mentioned tube type and a **** type, a refrigerant is moved, and it is made for a low-boiling point refrigerant to change the component ratio of mixed refrigerant liquid from an adult condition gradually [a high-boiling point refrigerant] in the adult condition in the process in which the evaporation

chamber which are two or more cooling rooms is passed. Each evaporation chamber is connected with migration tubing for refrigerant liquid, and migration tubing for refrigerant gases, and it is made to specifically have changed gradually a part for refrigerant liquid and gas, and each component ratio by adjusting the location of each migration tubing, and the flow rate of a there.
[0006]
[Problem(s) to be Solved by the Invention] In the case of the above-mentioned conventional equipment, structure becomes complicated also to remainder, and also there is a problem of needing control of the oil-level level in each evaporation chamber. Moreover, the passage of a cooled fluid has structure of an one pass, and optimization and the die length of the evaporator which is a heat exchanger when it is specifically going to make it 1.5 - 2.5 m/sec turn into impractical die length in a fluid rate. On the other hand, if it is going to make the die length of an evaporator practical, it is necessary to adopt the structure which carried out the parallel arrangement of two or more cylinders, or divided two or more single cylinders. if the parallel arrangement of the cylinder of two or more yen is carried out -- equipment -- **** -- while becoming, it becomes complicated, and if the divided structure which it hears is adopted, the problem that each liquid level control cannot be performed will arise. that by which this invention was made considering the trouble of the **** former as a technical problem -- it is -- practical die length -- carrying out -- control of the oil level of a refrigerant -- easy -- manufacture -- it is easy and is going to offer the broadside evaporator for non-azeotropy mixing refrigerants which does not produce change in the component ratio of the refrigerant in the inlet port and outlet of a refrigerant.
[0007]
[Means for Solving the Problem] In the broadside evaporator for non-azeotropy mixing refrigerants of the filled liquid system shell and the tube form where this invention pours a refrigerant to a shellside and pours a cooled fluid to a sink and a tubeside in order to solve the above-mentioned technical problem While dividing the space in shell into two or more small space which makes the both-ends side of this space an end face and making the volume of upper small space larger than downward small space The skew plate which forms opening which makes the adjoining small space comrade open for free passage in the either side of the above-mentioned both-ends sides, and forms the refrigerant passage of the shape of JIGUZAKU which continued from the refrigerant liquid inlet port of the lower part of the above-mentioned shell to the upside refrigerant gas outlet, The header which has the bridgewall which makes contrary to the flow direction of the refrigerant in the above-mentioned refrigerant passage the flow direction of the above-mentioned cooled fluid within two or more tubes which penetrate the above-mentioned shell to shaft orientations was prepared and formed.
[0008]
[Function] By constituting like the above-mentioned invention, a fluidity is acquired by refrigerant liquid, refrigerant liquid moves in each smallness space that there is no resistance almost horizontally, and collects on the lower part, a refrigerant gas moves toward the upper part, and gas drainage of the gas which evaporated from refrigerant liquid comes to be performed easily, and the liquid level control of only the last small space comes to be sufficient.
[0009]
[Example] Next, one example of this invention is explained according to a drawing. Drawing 1 and 2 show the broadside evaporator 1 for non-azeotropy mixing refrigerants concerning the 1st example of this invention, attach a header 12 in the both sides of the cylindrical shape-like shell 11, in shell 11, make many tubes 13 penetrate and are formed. In addition, by drawing 1 , although many tubes 13 appear in a longitudinal direction in fact, in order to make a drawing legible, about this tube 13, one is shown in instantiation.
[0010] Shell 11 has the refrigerant liquid inlet port 14 in the lower part, and has the refrigerant gas outlet 15 in the upper part. Moreover, in shell 11, three skew plates 16 are arranged by two or more skew plates 16 and this example which divide the space of this interior into two or more small space which makes that both-ends side an end face. Moreover, about the small space divided with this skew plate 16, the volume of upper small space is large rather than downward small space. Furthermore, the opening 17 which makes the adjoining small space comrade open for free passage is formed in the either side of the above-mentioned both-ends sides, and the refrigerant passage of the shape of JIGUZAKU which continued from the refrigerant liquid inlet port 14 of the lower part of the above-mentioned shell 11 to the upside refrigerant gas outlet 15 is formed.

[0011] For example, as four small space is formed in the case of the above-mentioned example and the arrow head of a continuous line shows drawing 1 to it The refrigerant which flowed into the 1st small space from the refrigerant liquid inlet port 14 moves to the method of the right, flows into the 2nd small space from the right end opening 17, and moves to a left. It flows into the 3rd small space from the left end opening 17, and it moves to the method of the right, it flows into the 4th small space from the right end opening 17, moves to a left, and goes away from the refrigerant gas outlet 15. In addition, in the case of this example, it has 4 path structures. Here, although the tilt angle of the skew plate 16 is not limited, it is desirable that it receives horizontally and is among 30 degrees - 45 degrees.

[0012] In the case of this example, in drawing 1 , the inlet port 21 and outlet 22 for cooled fluids are established in the left-hand side header 12 among two headers 12 attached in the both sides of shell 11. Moreover, the bridgewall 23 of two sheets which isolates the tube 13 which penetrates the tube [which penetrates the small space of the above 1st] 13, 2nd and tube 13 which penetrates 3rd small space and 2nd, and 3rd small space, and the tube 13 which penetrates the 4th small space is arranged in the interior of the header 12 of this left-hand side. Furthermore, the bridgewall 24 which isolates the tube 13 which penetrates the 1st and 2nd small space, and the tube 13 which penetrates the 3rd and 4th small space is arranged in the right-hand side header 12. And within shell 11, the flow direction of a refrigerant and the flow direction of the cooled fluid in a tube 13 become reverse, and will be in the condition of counterflow. Moreover, to on the whole the above-mentioned refrigerant moving towards the upper part from a lower part, on the whole, from the upper part, it turns caudad and this cooled fluid moves, as the arrow head of an alternate long and short dash line shows drawing 1 . Furthermore, each tube 13 is completely immersed into refrigerant liquid, and has become the thing of a filled liquid system, and the same thing.

[0013] In addition, in order to make the same the rate of flow of the cooled fluid within each tube 13, it is desirable to make the same the number of the tube 13 which penetrates each above-mentioned smallness space. And by forming opening 17 in the edge of right and left of the skew plate 16 by turns, and making it zigzag-like two or more pass, as mentioned above There is little flow resistance, and while a fluidity is acquired by refrigerant liquid, and refrigerant liquid moves in each smallness space that there is no resistance almost horizontally, collecting on the lower part and equalizing mostly the oil-level level in each smallness space, the gas drainage of the gas by which the refrigerant gas collected up and evaporated from refrigerant liquid is easy. Drawing 2 is what showed the situation of refrigerant liquid and a refrigerant firedamp migration, and as the said drawing Nakaya mark A shows, it moves to the 4th small space from the 1st small space, and toward the upper part, it is easy to move a refrigerant gas and it has become, and as an arrow head B similarly shows, it moves. Incidentally, the ratio of a high-boiling point refrigerant increases toward the 4th small space from the 1st small space.

[0014] Moreover, in this way, by the filled liquid system, by considering as two or more pass counterflow, the heat transfer engine performance can be good, can optimize the rate of flow of a cooled fluid, and can make the die length of an evaporator practical now. Furthermore, in the case of the above-mentioned example [the small space of last / liquid level control / of refrigerant liquid /, and], liquid level control is simple only for the 4th small space, this last space can take big space now, and the so-called liquid back into whom it is made to flow in the state of a liquid produces the refrigerant gas outlet 15 to a refrigerant.

[0015] Drawing 3 shows the heat pump which applied the evaporator 1 concerning the 1st example of the above, and the circulating flow way which the refrigerant containing a compressor 31, a condenser 32, an expansion valve 33, and an evaporator 1 closed is formed. In an evaporator 1, the level controller 34 which controls the oil-level level of the refrigerant liquid in this interior, for example, the 4th small space, is formed, and the opening of an expansion valve 33 is adjusted to it according to the height of this oil-level level. That is, the opening of an expansion valve 33 becomes large, so that this oil-level level becomes high. Moreover, the water which is a cooled fluid used as a low temperature side heat source, or the passage 36 which circulates brine is connected to the condenser 32 at the inlet port 21 and outlet 22 of passage 35 and an evaporator 1 which circulate the water used as an elevated-temperature side heat source.

[0016] And the refrigerant gas compressed with the compressor 31 as everyone knows is sent to a condenser 32, and a refrigerant gas gives and carries out the temperature reduction of the heat to the water which flows the inside of passage 35, condenses it in it, and results in an expansion valve 33 here. By expanding by the

expansion valve 33, the refrigerant which condensed and changed into the liquid condition evaporates in part, it flows in an evaporator 1, as mentioned above here, it carries out heat exchange through a tube 13, takes heat from a cooled fluid, evaporates completely, serves as a refrigerant gas, and repeats the same circulation as the above to a compressor 31 return and henceforth. On the other hand, the cooled fluid cooled with the evaporator 1 is used as a heat sink.

[0017] Drawing 4 shows the broadside evaporator 2 for non-azeotropy mixing refrigerants concerning the 2nd example of this invention, drawing 1 and the evaporator 1 of others shown in 2 are substantially the same except except for the point of having newly formed the high-boiling point refrigerant liquid extract opening 41, the same number is attached about the part which is mutually common, and explanation is omitted. Furthermore, if it explains in full detail, the 4th small space which is the last small space will be made to carry out opening of this high-boiling point refrigerant liquid extract opening 41 in this example. And from the last small space in which high-boiling point refrigerant liquid tends to pile up, this evaporator 2 extracts this refrigerant liquid compulsorily, prepares a heat exchanger separately, makes it possible to make it evaporate completely here, and is a thing.

[0018] About the part which is mutually common to the heat pump which shows the heat pump which applied the evaporator 2 and is shown in drawing 3 , drawing 5 attaches the same number and omits explanation. By this heat pump, while forming the intake liquid gas heat exchanger 51 between a condenser 32 and an expansion valve 33, the passage 52 which leads the refrigerant gas which came out of the refrigerant gas outlet 15 of an evaporator 2 to the intake liquid gas heat exchanger 51, and the passage 53 from the intake liquid gas heat exchanger 51 to [are open for free passage to this passage, and] the inlet port of a compressor 31 are formed. Moreover, the passage 54 linked to the high-boiling point refrigerant liquid extract opening 41 is made to have joined passage 52.

[0019] And the refrigerant gas and high-boiling point from an evaporator 2 are mixed, it leads to the intake liquid gas heat exchanger 51, and heat exchange is carried out between the high-pressure refrigerant liquid of a condenser 32 here, and the refrigerant liquid of the high-boiling point from the refrigerant liquid extract opening 41 is evaporated completely, and is sent out to a compressor 31. In addition, in the intake liquid gas heat exchanger 51, the level controller 55 which controls the oil-level level of the refrigerant liquid from the high-boiling point refrigerant liquid extract opening 41 of this interior is formed, and the opening of an expansion valve 33 is adjusted to it according to the height of this oil-level level. That is, the opening of an expansion valve 33 becomes large, so that this oil-level level becomes high. Thus, by leading high-boiling point refrigerant liquid to the intake liquid gas heat exchanger 51, refrigerant liquid is made to flow, the heat transfer engine performance is raised further, and it has carried out as [make / high-boiling point refrigerant liquid / gasify completely]. And a coefficient of performance is raised by keeping the component ratio of a refrigerant the same as that of the inlet port of an evaporator 2, and reducing the temperature in the refrigerant liquid inlet port 14 of an evaporator 2 by the **** configuration, and increasing the heating value which carries out heat exchange with an evaporator 2.

[0020]

[Effect of the Invention] In the broadside evaporator for non-azeotropy mixing refrigerants of the filled liquid system shell and the tube form where according to this invention pour a refrigerant to a shellside and a cooled fluid is poured to a sink and a tubeside so that more clearly than the above explanation While dividing the space in shell into two or more small space which makes the both-ends side of this space an end face and making the volume of upper small space larger than downward small space The skew plate which forms opening which makes the adjoining small space comrade open for free passage in the either side of the above-mentioned both-ends sides, and forms the refrigerant passage of the shape of JIGUZAKU which continued from the refrigerant liquid inlet port of the lower part of the above-mentioned shell to the upside refrigerant gas outlet, The header which has the bridgewall which makes contrary to the flow direction of the refrigerant in the above-mentioned refrigerant passage the flow direction of the above-mentioned cooled fluid within two or more tubes which penetrate the above-mentioned shell to shaft orientations is prepared, and it has formed.

[0021] Thus, the gas drainage of the gas which the refrigerant gas collected up while there was little flow resistance by preparing opening in one either side of the skew plates by turns, and making it zigzag-like two or more pass, the fluidity was acquired by refrigerant liquid, and refrigerant liquid moved in each smallness space

that there is no resistance almost horizontally, collecting on the lower part and equalizing mostly the oil-level level in each smallness space, and evaporated from refrigerant liquid becomes easy. Moreover, the heat transfer engine performance is good in this way by considering as two or more pass counterflow by the filled liquid system. The liquid level control of others and refrigerant liquid is good only in the last small space so that the rate of flow of a cooled fluid may be optimized and the die length of an evaporator can be made practical, and liquid level control is easy. This last space does so the effectiveness of being able to serve the so-called liquid back who big space can be taken [back] now and makes a refrigerant flow out of a refrigerant gas outlet in the state of a liquid.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] This invention relates to the broadside evaporator for non-azeotropy mixing refrigerants of the filled liquid system shell and the tube form where pour a refrigerant to a shellside and it pours a cooled fluid to a sink and a tubeside.

[Translation done.]

PRIOR ART

[Description of the Prior Art] While equipping with the output port of a refrigerant gas conventionally the evaporation chamber located in two or more evaporation chambers along the flow direction of a cooled fluid, and the evaporation chamber located in the lowest style side of a cooled fluid at the feed hopper of a non-azeotropy mixing refrigerant, and the maximum upstream of a cooled fluid, the evaporator for non-azeotropy mixing refrigerants equipped with the flow way for refrigerant liquid and the flow way for refrigerant gases between the evaporators contiguous to the flow direction of a cooled fluid is well-known (JP,61-262568,A). In the freezer using the non-azeotropy mixing refrigerant with which two or more refrigerants (single refrigerant) with which a dew-point differs from the boiling point under a fixed pressure were mixed, in order to raise the heat transfer engine performance in an evaporator, the heat exchanger of one-pass counterflow is specifically adopted as the counterflow and the pan which usually used the entrance temperature gradient produced in each of a refrigerant and cooled fluids (water, brine, etc.). In addition, when not changing the flow direction while a fluid flows toward an outlet in this specification from an inlet port, the case where the case, i.e., the flow direction, where the case where the flow direction is kept constant is changed only an one pass and at once is changed with forward and reverse is called two pass. The same is said of 3 or more ****s, for example, the case where the case where the flow direction is changed with forward, reverse, and forward is changed with three pass, forward, reverse, forward, and reverse is called four pass.

[0003] Drawing 6 shows the situation of the desirable temperature change of the refrigerant and the cooled fluid in the entrance of the evaporator of one-pass counterflow at the time of using a non-azeotropy mixing refrigerant. While heat exchange of them is carried out and a refrigerant and a cooled fluid carry out the temperature rise of the refrigerant toward an outlet from the inlet port, flowing to hard flow mutually, they carry out the temperature reduction of the cooled fluid toward an outlet from the inlet port. And a temperature gradient fixed between a refrigerant and a cooled fluid is maintained in each location within an evaporator, and heat exchange is performed similarly in each above-mentioned location.

[0004] In this case, it is good to make the same the component ratio of the refrigerant in a refrigerant inlet port (namely, refrigerant liquid inlet port) and a refrigerant outlet (refrigerant gas outlet), it is this point, and the thing of the **** type which a shellside is a cooled fluid, a tubeside is a refrigerant, and evaporates a refrigerant completely as an evaporator before reaching the outlet of a tubeside is desirable. On the other hand, in order to raise the heat transfer engine performance, that a tubeside makes a refrigerant flow within shell by the cooled fluid with a refrigerant has a desirable shellside in the filled liquid system which is not carried out.

[0005] The evaporator with a conventionally well-known publication in the above-mentioned official report combines the above-mentioned tube type and a **** type, a refrigerant is moved, and it is made for a low-boiling point refrigerant to change the component ratio of mixed refrigerant liquid from an adult condition gradually [a high-boiling point refrigerant] in the adult condition in the process in which the evaporation chamber which are two or more cooling rooms is passed. Each evaporation chamber is connected with migration tubing for refrigerant liquid, and migration tubing for refrigerant gases, and it is made to specifically have changed gradually a part for refrigerant liquid and gas, and each component ratio by adjusting the location of each migration tubing, and the flow rate of a there.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] In the broadside evaporator for non-azeotropy mixing refrigerants of the filled liquid system shell and the tube form where according to this invention pour a refrigerant to a shellside and a cooled fluid is poured to a sink and a tubeside so that more clearly than the above explanation, While dividing the space in shell into two or more small space which makes the both-ends side of this space an end face and making the volume of upper small space larger than downward small space The skew plate which forms opening which makes the adjoining small space comrade open for free passage in the either side of the above-mentioned both-ends sides, and forms the refrigerant passage of the shape of JIGUZAKU which continued from the refrigerant liquid inlet port of the lower part of the above-mentioned shell to the upside refrigerant gas outlet, The header which has the bridgewall which makes contrary to the flow direction of the refrigerant in the above-mentioned refrigerant passage the flow direction of the above-mentioned cooled fluid within two or more tubes which penetrate the above-mentioned shell to shaft orientations is prepared, and it has formed.
[0021] Thus, the gas drainage of the gas which the refrigerant gas collected up while there was little flow resistance by preparing opening in one either side of the skew plates by turns, and making it zigzag-like two or more pass, the fluidity was acquired by refrigerant liquid, and refrigerant liquid moved in each smallness space that there is no resistance almost horizontally, collecting on the lower part and equalizing mostly the oil-level level in each smallness space, and evaporated from refrigerant liquid becomes easy. Moreover, the heat transfer engine performance is good in this way by considering as two or more pass counterflow by the filled liquid system, The rate of flow of a cooled fluid is optimized, liquid level control is simple only for the small space of last [liquid level control / of others and refrigerant liquid], and the effectiveness of being able to serve the so-called liquid back into whom this last space can take big space now, and a refrigerant is made to flow out of a refrigerant gas outlet in the state of a liquid is done so so that the die length of an evaporator can be made practical.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the case of the above-mentioned conventional equipment, structure becomes complicated also to remainder, and also there is a problem of needing control of the oil-level level in each evaporation chamber. Moreover, the passage of a cooled fluid has structure of an one pass, and optimization and the die length of the evaporator which is a heat exchanger when it is specifically going to make it 1.5 - 2.5 m/sec turn into impractical die length in a fluid rate. On the other hand, if it is going to make the die length of an evaporator practical, it is necessary to adopt the structure which carried out the parallel arrangement of two or more cylinders, or divided two or more single cylinders. if the parallel arrangement of the cylinder of two or more yen is carried out -- equipment -- **** -- while becoming, it becomes complicated, and if the divided structure which it hears is adopted, the problem that each liquid level control cannot be performed will arise. that by which this invention was made considering the trouble of the **** former as a technical problem -- it is -- practical die length -- carrying out -- control of the oil level of a refrigerant -- easy -- manufacture -- it is easy and is going to offer the broadside evaporator for non-azeotropy mixing refrigerants which does not produce change in the component ratio of the refrigerant in the inlet port and outlet of a refrigerant.

[Translation done.]

* NOTICES *

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3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In the broadside evaporator for non-azeotropy mixing refrigerants of the filled liquid system shell and the tube form where this invention pours a refrigerant to a shellside and pours a cooled fluid to a sink and a tubeside in order to solve the above-mentioned technical problem While dividing the space in shell into two or more small space which makes the both-ends side of this space an end face and making the volume of upper small space larger than downward small space The skew plate which forms opening which makes the adjoining small space comrade open for free passage in the either side of the above-mentioned both-ends sides, and forms the refrigerant passage of the shape of JIGUZAKU which continued from the refrigerant liquid inlet port of the lower part of the above-mentioned shell to the upside refrigerant gas outlet, The header which has the bridgewall which makes contrary to the flow direction of the refrigerant in the above-mentioned refrigerant passage the flow direction of the above-mentioned cooled fluid within two or more tubes which penetrate the above-mentioned shell to shaft orientations was prepared and formed.
[0008]

[Translation done.]

EXAMPLE

[Example] Next, one example of this invention is explained according to a drawing. Drawing 1 and 2 show the broadside evaporator 1 for non-azeotropy mixing refrigerants concerning the 1st example of this invention, attach a header 12 in the both sides of the cylindrical shape-like shell 11, in shell 11, make many tubes 13 penetrate and are formed. In addition, by drawing 1 , although many tubes 13 appear in a longitudinal direction in fact, in order to make a drawing legible, about this tube 13, one is shown in instantiation.

[0010] Shell 11 has the refrigerant liquid inlet port 14 in the lower part, and has the refrigerant gas outlet 15 in the upper part. Moreover, in shell 11, three skew plates 16 are arranged by two or more skew plates 16 and this example which divide the space of this interior into two or more small space which makes that both-ends side an end face. Moreover, about the small space divided with this skew plate 16, the volume of upper small space is large rather than downward small space. Furthermore, the opening 17 which makes the adjoining small space comrade open for free passage is formed in the either side of the above-mentioned both-ends sides, and the refrigerant passage of the shape of JIGUZAKU which continued from the refrigerant liquid inlet port 14 of the lower part of the above-mentioned shell 11 to the upside refrigerant gas outlet 15 is formed.

[0011] For example, as four small space is formed in the case of the above-mentioned example and the arrow head of a continuous line shows drawing 1 to it The refrigerant which flowed into the 1st small space from the refrigerant liquid inlet port 14 moves to the method of the right, flows into the 2nd small space from the right end opening 17, and moves to a left. It flows into the 3rd small space from the left end opening 17, and it moves to the method of the right, it flows into the 4th small space from the right end opening 17, moves to a left, and goes away from the refrigerant gas outlet 15. In addition, in the case of this example, it has 4 path structures. Here, although the tilt angle of the skew plate 16 is not limited, it is desirable that it receives horizontally and is among 30 degrees - 45 degrees.

[0012] In the case of this example, in drawing 1 , the inlet port 21 and outlet 22 for cooled fluids are established in the left-hand side header 12 among two headers 12 attached in the both sides of shell 11. Moreover, the bridgewall 23 of two sheets which isolates the tube 13 which penetrates the tube [which penetrates the small space of the above 1st] 13, 2nd and tube 13 which penetrates 3rd small space and 2nd, and 3rd small space, and the tube 13 which penetrates the 4th small space is arranged in the interior of the header 12 of this left-hand side. Furthermore, the bridgewall 24 which isolates the tube 13 which penetrates the 1st and 2nd small space, and the tube 13 which penetrates the 3rd and 4th small space is arranged in the right-hand side header 12. And within shell 11, the flow direction of a refrigerant and the flow direction of the cooled fluid in a tube 13 become reverse, and will be in the condition of counterflow. Moreover, to on the whole the above-mentioned refrigerant moving towards the upper part from a lower part, on the whole, from the upper part, it turns caudad and this cooled fluid moves, as the arrow head of an alternate long and short dash line shows drawing 1 . Furthermore, each tube 13 is completely immersed into refrigerant liquid, and has become the thing of a filled liquid system, and the same thing.

[0013] In addition, in order to make the same the rate of flow of the cooled fluid within each tube 13, it is desirable to make the same the number of the tube 13 which penetrates each above-mentioned smallness space. And by forming opening 17 in the edge of right and left of the skew plate 16 by turns, and making it zigzag-like two or more pass, as mentioned above There is little flow resistance, and while a fluidity is acquired by refrigerant liquid, and refrigerant liquid moves in each smallness space that there is no resistance almost

horizontally, collecting on the lower part and equalizing mostly the oil-level level in each smallness space, the gas drainage of the gas by which the refrigerant gas collected up and evaporated from refrigerant liquid is easy. Drawing 2 is what showed the situation of refrigerant liquid and a refrigerant firedamp migration, and as the said drawing Nakaya mark A shows, it moves to the 4th small space from the 1st small space, and toward the upper part, it is easy to move a refrigerant gas and it has become, and as an arrow head B similarly shows, it moves. Incidentally, the ratio of a high-boiling point refrigerant increases toward the 4th small space from the 1st small space.

[0014] Moreover, in this way, by the filled liquid system, by considering as two or more pass counterflow, the heat transfer engine performance can be good, can optimize the rate of flow of a cooled fluid, and can make the die length of an evaporator practical now. Furthermore, in the case of the above-mentioned example [the small space of last / liquid level control / of refrigerant liquid /, and], liquid level control is simple only for the 4th small space, this last space can take big space now, and the so-called liquid back into whom it is made to flow in the state of a liquid produces the refrigerant gas outlet 15 to a refrigerant.

[0015] Drawing 3 shows the heat pump which applied the evaporator 1 concerning the 1st example of the above, and the circulating flow way which the refrigerant containing a compressor 31, a condenser 32, an expansion valve 33, and an evaporator 1 closed is formed. In an evaporator 1, the level controller 34 which controls the oil-level level of the refrigerant liquid in this interior, for example, the 4th small space, is formed, and the opening of an expansion valve 33 is adjusted to it according to the height of this oil-level level. That is, the opening of an expansion valve 33 becomes large, so that this oil-level level becomes high. Moreover, the water which is a cooled fluid used as a low temperature side heat source, or the passage 36 which circulates brine is connected to the condenser 32 at the inlet port 21 and outlet 22 of passage 35 and an evaporator 1 which circulate the water used as an elevated-temperature side heat source.

[0016] And the refrigerant gas compressed with the compressor 31 as everyone knows is sent to a condenser 32, and a refrigerant gas gives and carries out the temperature reduction of the heat to the water which flows the inside of passage 35, condenses it in it, and results in an expansion valve 33 here. By expanding by the expansion valve 33, the refrigerant which condensed and changed into the liquid condition evaporates in part, it flows in an evaporator 1, as mentioned above here, it carries out heat exchange through a tube 13, takes heat from a cooled fluid, evaporates completely, serves as a refrigerant gas, and repeats the same circulation as the above to a compressor 31 return and henceforth. On the other hand, the cooled fluid cooled with the evaporator 1 is used as a heat sink.

[0017] Drawing 4 shows the broadside evaporator 2 for non-azeotropy mixing refrigerants concerning the 2nd example of this invention, drawing 1 and the evaporator 1 of others shown in 2 are substantially the same except except for the point of having newly formed the high-boiling point refrigerant liquid extract opening 41, the same number is attached about the part which is mutually common, and explanation is omitted. Furthermore, if it explains in full detail, the 4th small space which is the last small space will be made to carry out opening of this high-boiling point refrigerant liquid extract opening 41 in this example. And from the last small space in which high-boiling point refrigerant liquid tends to pile up, this evaporator 2 extracts this refrigerant liquid compulsorily, prepares a heat exchanger separately, makes it possible to make it evaporate completely here, and is a thing.

[0018] About the part which is mutually common to the heat pump which shows the heat pump which applied the evaporator 2 and is shown in drawing 3 , drawing 5 attaches the same number and omits explanation. By this heat pump, while forming the intake liquid gas heat exchanger 51 between a condenser 32 and an expansion valve 33, the passage 52 which leads the refrigerant gas which came out of the refrigerant gas outlet 15 of an evaporator 2 to the intake liquid gas heat exchanger 51, and the passage 53 from the intake liquid gas heat exchanger 51 to [are open for free passage to this passage, and] the inlet port of a compressor 31 are formed. Moreover, the passage 54 linked to the high-boiling point refrigerant liquid extract opening 41 is made to have joined passage 52.

[0019] And the refrigerant gas and high-boiling point from an evaporator 2 are mixed, it leads to the intake liquid gas heat exchanger 51, and heat exchange is carried out between the high-pressure refrigerant liquid of a condenser 32 here, and the refrigerant liquid of the high-boiling point from the refrigerant liquid extract opening 41 is evaporated completely, and is sent out to a compressor 31. In addition, in the intake liquid gas heat

exchanger 51, the level controller 55 which controls the oil-level level of the refrigerant liquid from the high-boiling point refrigerant liquid extract opening 41 of this interior is formed, and the opening of an expansion valve 33 is adjusted to it according to the height of this oil-level level. That is, the opening of an expansion valve 33 becomes large, so that this oil-level level becomes high. Thus, by leading high-boiling point refrigerant liquid to the intake liquid gas heat exchanger 51, refrigerant liquid is made to flow, the heat transfer engine performance is raised further, and it has carried out as [make / high-boiling point refrigerant liquid / gasify completely]. And a coefficient of performance is raised by keeping the component ratio of a refrigerant the same as that of the inlet port of an evaporator 2, and reducing the temperature in the refrigerant liquid inlet port 14 of an evaporator 2 by the **** configuration, and increasing the heating value which carries out heat exchange with an evaporator 2.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view of the broadside evaporator for non-azeotropy mixing refrigerants concerning the 1st example of this invention.
[Drawing 2] It is the II-II line sectional view of the evaporator shown in drawing 1 .
[Drawing 3] It is drawing showing the configuration of the heat pump which applied drawing 1 and the evaporator shown in 2.
[Drawing 4] It is the sectional view of the broadside evaporator for non-azeotropy mixing refrigerants concerning the 2nd example of this invention.
[Drawing 5] It is drawing showing the configuration of the heat pump which applied the evaporator shown in drawing 4 .
[Drawing 6] It is drawing showing the situation of the desirable temperature change in the evaporator of the counterflow at the time of using a non-azeotropy mixing refrigerant.
[Description of Notations]
1 Two Evaporator 11 Shell
12 Header 13 Tube
14 Refrigerant Liquid Inlet Port 15 Refrigerant Gas Outlet
16 Skew Plate 17 Opening

[Translation done.]

* NOTICES *

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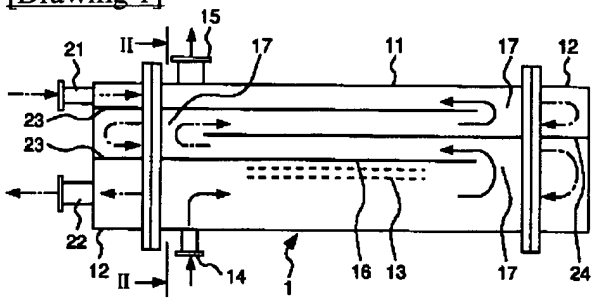
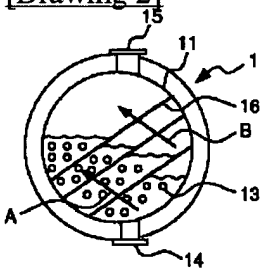
DRAWINGS

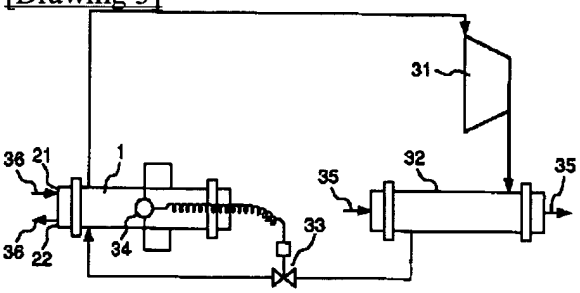
[Drawing 1]



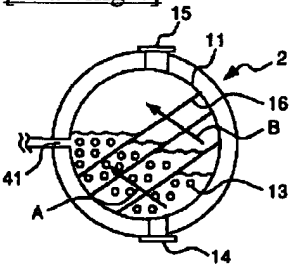
[Drawing 2]



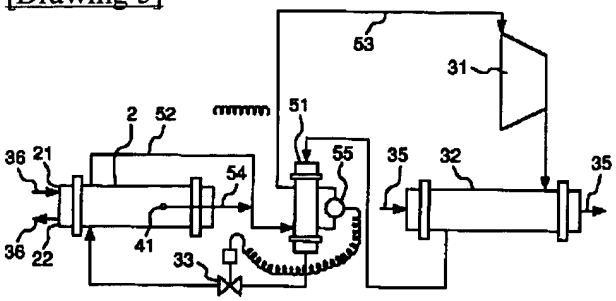
[Drawing 3]



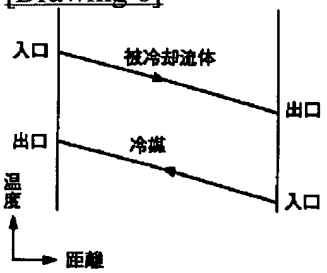
[Drawing 4]



[Drawing 5]



[Drawing 6]



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